

PROJECT NUMBER : 4017  
PROJECT TITLE : Paper Making Processes  
PROJECT LEADER : R. M. Rogers  
PERIOD COVERED : February, 1991

## **I. LOW SIDESTREAM SMOKE PROJECT**

- A. **Objective:** Develop proprietary cigarette papers for low sidestream smoke.
- B. **Results:** The papermaking properties of sol-gel derived magnesium compound particles were evaluated in the handsheet lab. The samples exhibit properties typical of sol-gel derived fillers, slow drainage and poor retention with the propensity to restricting porosity. Several conventional papermaking approaches were utilized in an attempt to improve performance (inclusion of retention aids and an increase in water temperature). Both approaches mitigate the negative attributes of these materials. It is recommended that a large sample of this material be prepared and that additional tests be conducted to evaluate slurry properties (contact angle, surface tension). Coating or sizing was also recommended as a possible alternative.

Three additional NY Poly samples containing various levels of hydromagnesite and brucite were evaluated this month (7619-196A, B, & C). Increasing the level of hydromagnesite over brucite improves the papermaking properties of the fillers (porosity/freeness relationship) and sheet opacity.

- C. **Plans:** Continue supporting the production of pilot quantities of cigarette paper at Maine.

## **II. BANDED PAPERS (TOMORROW)**

- A. **Objective:** Incorporate cross directional bands of fiber and/or filler in cigarette papers in order to vary cigarette burn rate.
- B. **Results:** Engineering initiated a secrecy agreement and order with Beloit to design and estimate the cost of constructing a banded paper application device that would be placed above a paper machine's couch roll (a soft rubber covered rotogravure type applicator). Philip Morris' commitment at this time is \$4,000. Construction and evaluation on Beloit's pilot paper machine (only 2 ft. wide but operated at a commercial paper machine speed of 500 ft/min.) is expected to cost in excess of \$67,000 dependent on the number of modifications and runs needed to evaluate this concept. If construction costs are reasonable, the device could be installed on Beloit's pilot paper machine by June 1991.

A trial was conducted at Maine this month to evaluate the rotogravure concept utilizing a modified Daubing Dandy roll. The objective of this trial was to reduce the application rate to  $\sim 1 \text{ g/m}^2$  while maintaining band contrast. Although band contrast is hindered by the fibrous nature of the two materials (Cellulon or Buckeye Cellulose), due to separation of the fiber and water mix, the materials transfer to the

base sheet. Homogenizing these materials should improve the flow/separation character of the slurries. These trials underscore the necessity of placing the rotogravure device above a vacuum to assist in transfer. The drum must contact the sheet and the alignment of the application device with the base web is critical. Maintaining a clean drum may also be a problem. These factors will be included in the design criteria for the unit that is being constructed at Beloit.

- C. **Plans:** Repeat trials at Maine utilizing homogenized Cellulon to improve band contrast.

### III. PROPRIETARY FILTER MATERIAL

- A. **Objective:** Develop a proprietary filter material in web form.

- B. **Results:** Two trials were conducted at James River's Neenah Technical Center this month. The objective of the first trial was to evaluate the web making characteristics of CA obtained from various sources (Courtaulds and Celanese) for scale-up to a mill run in late March 1991. Celanese CA staple (round CA) dispersed better and required less refining to form an acceptable web. Courtaulds CA required four times the refining to achieve a comparable web. The method of dispersion (low consistency) also improves the properties of the web.

The second trial was conducted to evaluate the inclusion of polyvinyl alcohol (PVOH). The objective of this trial was to improve PM web's tensile strength while reducing the tendency to lint during filter making. A portion of the web rolls will be sizing with soluble PVOH. Additional rolls were produced with a insoluble form of PVOH (insoluble in water at <150°F) added as a filler to the sheet (2.5% and 5%). It was anticipated that once the sheet contacted the Yankee, the PVOH would solubilize and migrate throughout the web during the drying process. Manipulating the moisture level of the web contacting the Yankee and the drying temperature resulted in a modest improvement in the sheet's tensile strength. Dye testing indicates that most of the PVOH particles are only partially dispersed. This approach would require additional development efforts to optimize the PVOH particle size, response to temperature or moisture and the time, temperature, and moisture balance on any paper machine's dryer.

In its current configuration (75% cut CA and 25% refined softwood, no PHOH addition or calendering) PM web produced at James River's Gouverneur mill should approach practically all the properties of Tela web. At the same sheet weight it is projected that MD tensile will be -0.9+ kg/in versus 1.3 kg/in for Tela web. Both porosity and caliper will be slightly greater than Tela web (5500 Coresta and 6.0 mils versus 3600 Coresta and 5.0 mils respectively). Given acceptable formation on the paper machine wire, web properties are highly contingent on the amount of disruption caused by the action of the creping blade. Every effort will be made to minimize this disruption while maintaining acceptable crepe quality and elongation properties. Off machine calendering is also being investigated as a possible option to reduce linting.

One large roll of 100% softwood was also produced as a duplicate of Tela web. The sheet is slightly more porous, 5300 Coresta versus 3600 target. The James River representative believes that Tela web can be duplicated at the Gouverneur mill location.

**C. Plans:** Complete a mill trial of PM web at James River's Gouverneur mill.

Evaluate off machine calendering as a possible method to reduce web linting.